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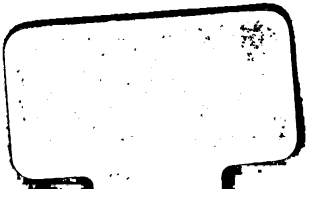

THE

# SCREW CUTTERS' ASSISTANT;

SHOWING

## AN EASY METHOD

Of obtaining the requisite Number of Teeth in the Wheels, and where to place them,

*TO CUT SCREWS OF STATED PITCHES*

BY

## MENTAL CALCULATION.

By WILLIAM BRAGG.

Showing at a glance, the requisite Wheels to be used and where to place them, for Cutting Screws of various pitches from 1 thread in 3 inches, to 36 threads in one inch,

ENTERED AT STATIONERS' HALL.

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# INTRODUCTION.

THE AUTHOR, in introducing this Valuable little work to Engineers and Machinists in general, having during many years practical experience been convinced of the unnecessary number of figures used, and time wasted, in calculations for ordinary Screw Cutting by men of sound mental capacity who have, not perhaps, had the opportunity of obtaining a sound knowledge of arithmatic, feels confident his system of Mental Calculation for Screw-Cutting, will prove a very useful assistant, and a boon to those persons whose daily bread is earned among machinery.

FIG. 1,

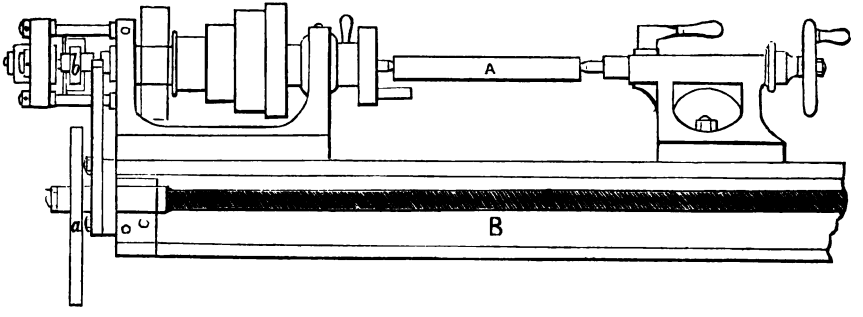
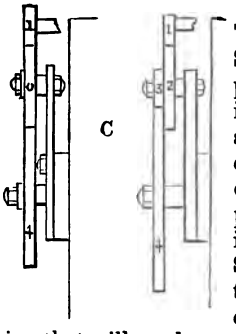



Fig. 1 represents a Set of Wheels, with part of Lathe shown, also Leading Screw, and Piece of Iron on which Screw is to be cut.

*(For diagram of Single and Double Wheels, see next page.)*




RULE The number of Threads in the Leading Screw (B) gives the proportionate number of teeth in Wheel (C) on Mandril, and the number of Threads desired to be cut on piece of Iron (A) gives the proportionate number of teeth in Wheel (a) on Leading Screw, with one or two intermediate Wheels as required. if only one, any size that will work can be used ; If two, see examples on Stud (C).

EXAMPLE 1—Required to cut a Screw 9 Threads per Inch—The Leading Screw on Lathe being 2 Threads per Inch—To 2 add 0, viz., 20, which you put on Mandril—To 9 add 0, viz., 90, which you put on Leading Screw, and one Wheel on Stud (C). to connect the two Wheels above named—will cut the required Pitch.

If you have not the Wheels named, multiply by 2 gives 40 and 180 ;—or by 4 gives 80 and 360.

If you have a 20 and not a 90 Wheel, you may take a 30 instead of 90, which is one third, and place 2 Intermediate Wheels on Stud (C), bearing one third proportion, viz., 60 and 20, or 72 and 24, or 45 and 15, any of which pair will give the same result.

It you have the 90 & not the 20, you may take 40 instead of 20 and place two intermediate

Wheels on Stud (C). bearing the same proportions that 40 does to 20, viz., 40 and 20, or 20 and 10, or 60 and 30, or 80 and 40, or 50 and 25, or 100 and 50.

EXAMPLE 2—. To cut 9 Threads per Inch—The Leading Screw being 5⅓ Threads per Inch always multiply by 3, viz., 3 times 9 gives 27, which, you place on Leading Screw, and 3 times 5⅓ gives 16 which you place on Mandril; or multiplied by 2 gives 32 and 54; or by 3 gives 48 and 81. Thus, by examples given, the reader will see he is not bound to use one pair of wheels in particular, yet preference should be given to those of large diameter that the less strain may be thrown on each tooth) taking care that they bear the like proportion and gear into each other.

NOTE.—In cutting two or more Screws, if possible, the wheel placed on Mandril should contain the number of teeth that will divide by the number of threads required in one pitch, or turn of lathe, without leaving a remainder.

In order, if required, to cut two threads, the wheel on Lathe Mandril may be withdrawn from Intermediate, and with the Mandril turned half way round and replaced into the same tooth from which it was withdrawn in Intermediate. In like manner if three or more threads, divide by 3 or more, withdraw and turn wheel one-third and replace as before, three or more times. In cutting long screws, instead of running slowly back, previous to starting the Saddle should be put *hard* back (always to the same place), and a mark

placed on Leading Screw, also one on Lathe-Chuck —Wheel on Mandril *say on the top* or uppermost, and when required to run back the Saddle, disengage the Nut from Screw, wind back the Saddle to the same place from whence it was started, bring round the Lathe until the *marks* on Screw & Chuck or Wheel on Mandril are at the same position as before, say on top or uppermost, when the Nut may be engaged to Screw and operations repeated.

Also to cut left-hand Thread, a second Stud and Wheel is necessary to reverse the motion of the Saddle.

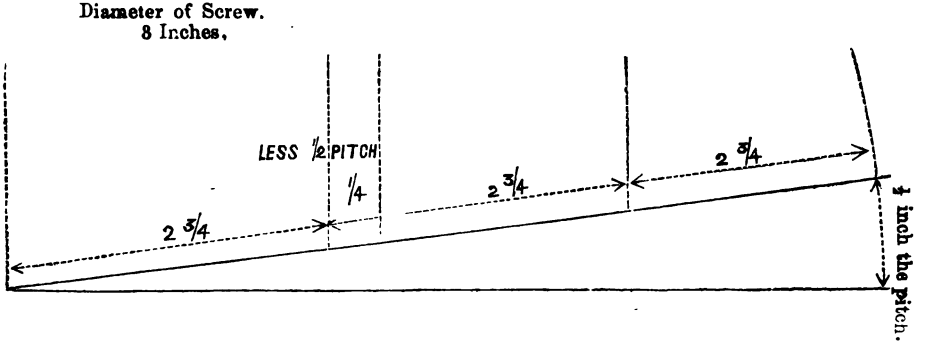
---

The Author has in some instances given more than one set of Wheels for cutting the same pitch of Screw, and in a manner calculated to illustrate the system laid down in this work, showing more plainly than usual how to obtain other wheels not named in the tables; also, that while this book is useful to the workman, it cannot detract, but on the contrary, may add something to the knowledge of the scientific man.

---

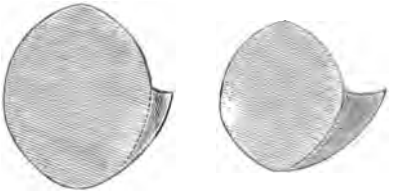
To obtain the necessary Rake, or Lean, a tool should have in Screw-cutting, substract from the diameter of intended screw the depth of thread, which is generally half the pitch, and multiply by 3; a line drawn the above length and leant out of upright will give the required angle or lean. For example see page 8.

EXAMPLE.—For a screw ½ inch pitch and 3 inches diameter, thus;—



A Tool for Cutting Threads in Nuts of small internal diameters should be made of an oval form in section, in order that the greater amount of strength may be given vertically, and yet allow sufficient room to draw back the tool horizontally, thus :

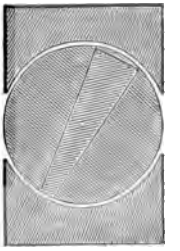
EXAMPLE.—To cut a 1 inch Nut-Thread 1-16 inch deep, thus :—



The largest section would fill the Nut, therefore the small size would be best for the sake of clearance.

In fixing the Tool in Slide-rest the point should be placed slightly above the centre to allow for the spring of the tool, in order that it may not be too low when the Tool is cutting.

A very good Tool for cutting outside screws can be made from Round Steel, by using packings top and bottom, with one curved face on each to fit the tool, which will enable the workman to move or turn the tool to any required angle.



Section, thus

TABLE 1.—WHEELS for Cutting Screws of stated pitches, for Lathe with Leading Screw 2 threads per inch.

| Threads. Pitch. | 1 Mandril. | 2 Inter. | 3 Stud. | 4 Screw. |
|---|---|---|---|---|
| 1 per 3 inches | 120 | | | 20 |
| | 60 | 25 | 50 | 20 |
| 1 2¾ | 110 | | ,, | 20 |
| | 55 | 25 | 50 | 20 |
| 1 2½ | 100 | | ,, | 20 |
| | 50 | 25 | 50 | 20 |
| 1 2¼ | 90 | | .. | 20 |
| | 45 | 25 | 50 | 20 |
| 1 2 | 80 | | .. | 20 |
| 1 1¾ | 70 | | .. | 20 |
| 1 1½ | 60 | | .. | 20 |
| 1 1¼ | 50 | | .. | 20 |
| 1 7/8 | 70 | | .. | 40 |
| 1 3/4 | 60 | | .. | 40 |
| 1 5/8 | 50 | | .. | 40 |
| 1 3/4 | 30 | | .. | 40 |
| 1 1 inch | 100 | | .. | 50 |
| 2 ,, | 100 | | .. | 120 |
| 3 ,, | 20 | | .. | 30 |
| | 40 | | .. | 60 |
| 4 ,, | 20 | | .. | 40 |
| | 40 | | .. | 80 |
| 5 ,, | 20 | | .. | 50 |
| | 40 | | .. | 100 |
| 6 ,, | 20 | | .. | 60 |
| | 40 | 50 | 25 | 60 |
| 7 ,, | 20 | | .. | 70 |
| 8 ,, | 20 | | .. | 80 |
| 9 ,, | 20 | | .. | 90 |
| 10 ,, | 20 | | .. | 100 |

TABLE 1.—*continued.*

| Threads. Pitch. | Mandril. | Inter. Stud | Screw. |
|---|---|---|---|
| 11 per inch | 30 | 60 20 | 55 |
| 12 ,, | 20 | 50 25 | 60 |
| 13 ,, | 20 | 50 25 | 65 |
| 14 ,, | 20 | 50 25 | 70 |
| | 20 | .. | 140 |
| 15 ,, | 20 | 50 25 | 75 |
| 16 ,, | 20 | 50 25 | 80 |
| 17 ,, | 20 | 50 25 | 85 |
| | 10 | .. | 85 |
| 18 ,, | 20 | 50 25 | 90 |
| 19 ,, | 20 | 50 25 | 95 |
| 20 ,, | 10 | .. | 100 |
| 21 ,, | 10 | .. | 105 |
| | 20 | 90 30 | 70 |
| 22 ,, | 10 | 40 20 | 55 |
| | 10 | .. | 110 |
| 23 ,, | 20 | 60 30 | 115 |
| 24 ,, | 10 | .. | 120 |
| 25 ,, | 10 | 100 20 | 25 |
| 26 ,, | 20 | 60 30 | 230 |
| 27 ,, | 10 | 90 30 | 45 |
| 28 ,, | 10 | 60 30 | 70 |
| 29 ,, | 10 | .. | 145 |
| 30 ,, | 10 | 90 30 | 50 |
| 31 ,, | 10 | .. | 155 |
| 32 ,, | 10 | 60 30 | 80 |
| 33 ,, | 10 | 45 30 | 110 |
| 34 ,, | 10 | .. | 170 |
| 35 ,, | 10 | 100 20 | 35 |
| | 10 | .. | 175 |
| 36 ,, | 20 | 100 25 | 90 |
| | 10 | ... | 180 |
| | 20 | 60 30 | 180 |

TABLE 2. Wheels for Cutting Screws of stated pitches, for Lathe with Leading Screw 4 threads per inch.

| Threads. | Pitches | 1 Mandril. | 2 Inter. | 3 Stud. | 4 Screw. |
|---|---|---|---|---|---|
| 1 per | 1½ inches. | 80 | 40 | 90 | 30 |
| 1 | 1¼ | 100 | 30 | 60 | 40 |
| 1 | 1¼ | 100 | 50 | 90 | 40 |
| 1 | [illegible] | 70 | .. | | 20 |
| 1 | [illegible] | 60 | ... | | 20 |
| 1 | [illegible] | 50 | 30 | 60 | 40 |
| 1 | [illegible] | 60 | .. | | 40 |
| 1 | 1 inch | 80 | 30 | 60 | 40 |
| | | 80 | .. | | 20 |
| 2 | ,, | 80 | .. | | 40 |
| | | 40 | .. | | 20 |
| 3 | ,, | 40 | .. | | 30 |
| 4 | ,, | 40 | .. | | 40 |
| 5 | ,, | 40 | .. | | 50 |
| 6 | ,, | 40 | .. | | 60 |
| | | 20 | .. | | 30 |
| 7 | ,, | 40 | .. | | 70 |
| 8 | ,, | 40 | .. | | 80 |
| | | 20 | .. | | 40 |
| 9 | ,, | 40 | .. | | 90 |
| 10 | ,, | 24 | .. | | 60 |
| | | 40 | .. | | 100 |
| 11 | ,, | 40 | .. | | 110 |
| | | 20 | .. | | 55 |
| 12 | ,, | 20 | .. | | 60 |
| 13 | ,, | 20 | .. | | 65 |
| 14 | ,, | 20 | .. | | 70 |
| 15 | ,, | 40 | .. | | 150 |
| | | 20 | .. | | 75 |
| 16 | ,, | 20 | .. | | 80 |

TABLE 2—*continued.*

| Threads. Pitches | 1 Mandril. | 2 Inter. | 3 Stud. | 4 Screw. |
|---|---|---|---|---|
| 17 per inch | 20 | .. | | 85 |
| 18 ,, | 20 | .. | | 90 |
| 19 ,, | 20 | .. | | 95 |
| 20 ,, | 20 | .. | | 100 |
| | 30 | 60 | 40 | 100 |
| 21 ,, | 20 | .. | | 105 |
| 22 ,, | 20 | 60 | 30 | 55 |
| 23 ,, | 20 | .. | | 115 |
| 24 ,, | 20 | 80 | 60 | 90 |
| | 20 | 50 | 25 | 60 |
| 25 ,, | 20 | .. | | 125 |
| 26 ,, | 20 | 50 | 25 | 65 |
| 27 ,, | 20 | .. | | 135 |
| 28 ,, | 20 | 70 | 50 | 100 |
| 29 ,, | 20 | .. | | 145 |
| 30 ,, | 30 | 90 | 40 | 100 |
| 31 ,, | 20 | .. | | 155 |
| 32 ,, | 20 | 50 | 25 | 80 |
| 33 ,, | 20 | .. | | 165 |
| 34 ,, | 20 | 50 | 25 | 85 |
| 35 ,, | 20 | .. | | 175 |
| 36 ,, | 20 | 90 | 50 | 100 |
| | 20 | .. | | 180 |

TABLE 3. Wheels for Cutting Screws of stated pitches, for Lathe with Leading Screw $5\frac{1}{3}$ threads per inch.

| Threads. Pitches | 1 Mandril. | 2 Inter. | 3 Stud. | 4 Screw. |
|---|---|---|---|---|
| 1 per $1\frac{1}{3}$ inches. | 80 | | | 10 |
| | 240 | | | 30 |
| | 80 | 24 | 72 | 30 |
| 1 $1\frac{1}{4}$ „ | 200 | .. | | 30 |
| | 50 | 20 | 80 | 30 |
| 1 $\frac{7}{8}$ „ | 140 | .. | | 30 |
| | 70 | 25 | 50 | 30 |
| 1 $\frac{3}{4}$ „ | 120 | .. | | 30 |
| 1 $\frac{5}{8}$ „ | 100 | .. | | 30 |
| 1 $\frac{3}{4}$ „ | 60 | .. | | 30 |
| 1 1 „ | 160 | .. | | 30 |
| | 10 | 25 | 50 | 30 |
| 2 „ | 40 | 25 | 50 | 30 |
| | 80 | .. | | 30 |
| | 80 | 25 | 50 | 60 |
| 3 „ | 80 | 25 | 50 | 90 |
| | 80 | 24 | 48 | 90 |
| 4 „ | 40 | .. | | 30 |
| | 60 | .. | | 45 |
| 5 „ | 48 | .. | | 45 |
| 6 „ | 24 | .. | | 27 |
| | 32 | .. | | 36 |
| 7 „ | 32 | .. | | 42 |
| 8 „ | 24 | .. | | 36 |
| 9 „ | 32 | .. | | 54 |
| 10 „ | 32 | .. | | 60 |
| 11 „ | 32 | .. | | 66 |
| 12 „ | 24 | .. | | 54 |
| 13 „ | 32 | .. | | 78 |
| 14 „ | 16 | .. | | 42 |

TABLE. 3—*continued*

| Threads. Pitches | 1 Mandril. | 2 Inter. | 3 Stud. | 4 Screw. |
|---|---|---|---|---|
| 15 per inch | 32 | .. | | 90 |
| 16 ,, | 20 | .. | | 60 |
| 17 ,, | 16 | .. | | 51 |
| 18 ,, | 16 | .. | | 54 |
| 19 ,, | 16 | .. | | 57 |
| 20 ,, | 16 | .. | | 60 |
| ,, | 32 | 50 .. | 25 | 60 |
| 21 ,, | 16 | .. | | 63 |
| 22 ,, | 16 | 50 .. | 25 | 33 |
| 23 ,, | 16 | .. | | 69 |
| 24 ,, | 16 | .. | | 72 |
| ,, | 16 | 48 .. | 24 | 36 |
| ,, | 32 | 48 .. | 24 | 72 |
| 25 ,, | 16 | .. | | 75 |
| 26 ,, | 16 | .. | | 78 |
| ,, | 32 | 48 .. | 24 | 78 |
| 27 ,, | 16 | .. | | 81 |
| ,, | 16 | 72 .. | 24 | 27 |
| 28 ,, | 16 | .. | | 84 |
| ,, | 16 | 50 .. | 25 | 42 |
| 29 ,, | 16 | .. | | 87 |
| 30 ,, | 16 | 72 .. | 24 | 30 |
| 31 ,, | 16 | .. | | 90 |
| ,, | 16 | 72 .. | 24 | 31 |
| 32 ,, | 16 | 72 .. | 24 | 32 |
| 33 ,, | 16 | 72 .. | 24 | 33 |
| 34 ,, | 16 | 72 .. | 24 | 34 |
| 35 ,, | 16 | 72 .. | 24 | 35 |
| 36 ,, | 16 | 72 .. | 24 | 36 |
| ,, | 16 | .. | | 108 |